MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

DCS5038 – PROGRAM DESIGN

(All IT Groups)

31 MAY 2017
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT:

1. This question paper consists of 9 pages with 5 questions.
2. **SECTION A**: Answer **ALL** questions.
3. **SECTION B**: Answer **ONLY ONE (1)** question.
4. Please print all your answers in the Answer Booklet provided.

SECTION A (75 Marks)

Instruction: *Answer **ALL** questions from this section and write your answers in the answer booklet provided.*

QUESTION 1 (25 Marks)

In general, most countries follow two principles when it comes to personal income tax assessment. Firstly, tax rate is on chargeable income which means that it is calculated after deducting the tax exemptions and tax reliefs;

$$chargeable\ income = incomes - exemptions - reliefs$$

Secondly, the tax rate is progressive, thus an individual pays the higher rate on the amount which is above the rate. For example, a person who has a chargeable income of RM 140,000, the tax rate of 24% is only applicable on the final RM40,000 amount. The first RM 100,000 is subjected to lower rates (refer table below).

Guidelines.

- Initialize all the required variables.
- Get the inputs of *income*, *exemptions* and *reliefs* from the user.
- Calculate the *chargeable income* based on the formula given above.
- Based on the following tax assessment table, determine the *tax*.
  Example :
  Let's say the income is RM84500.00.
  First RM70000.00, the tax is RM2750.00.
  Next RM14500.00 has a tax of 16% = RM2320.00
  Tax = RM2750.00 + RM2320.00 = RM 5070.00

Chargeable Income (RM)	Calculation (RM)	Rate (%)	Tax (RM)
0 - 35,000	On the 1st 35,000	0	0
35,001 - 50,000	On the 1st 35,000	0	0
	Next 15,000	5	750
50,001 – 70,000	On the 1st 50,000		750
	Next 20,000	10	2,000
70,001 - 100,000	On the 1st 70,000		2,750
	Next 30,000	16	4,800
Exceeding 100,000	On the 1st 100,000		7,550
	Each next ringgit	24	...

- Display the *chargeable income* and *tax*.
- Use *do-while* loop to ask the user whether to redo or complete the tax assessment process.

a. Based on the description given above, draw the **flowchart**. [13 marks]
b. Based on the description given above, write the **pseudocode**. [12 marks]

Continued...

QUESTION 2 (25 Marks)

a. Trace the output of the following code segment. [6 marks]

i.
```
int x = 5, y = 9, i = -6, j = 10;

printf("\n%d", j + --y * x--);
printf("\n%d", x - y / --i);
printf("\n%d", y * i + x * j);
```

ii.
```
int x = 3, y = -7, z = 11;

switch(x)
{
   case 1: y += (x * 3);
   case 2: break;
   case 3: x -= (z - 5);
   case 4: z = --x + 7 ; break;
}

printf("\nx = %d", x);
printf("\ny = %d", y);
printf("\nz = %d", z);
```

b. Convert the following formulas to its proper C expressions. Use appropriate built-in functions from the *math.h* header file. [4 marks]

i. $\sqrt{\frac{7xyz}{j-i}} + m \div n$

ii. $a + b\left(c - \frac{1}{x}\right)^5$

c. Write the equivalent *if-else* and *switch case* statement for the following statements. (Convert from *if-else* to *switch case* and vice versa) [8 marks]

```
switch(code)
{
     case 'M':
          if(option == 1)
               strcpy(program, "Diploma in Business Administration");
          else if(option == 2)
               strcpy(program, "Diploma in Accounting");
          else if(option == 3)
               strcpy(program, "Diploma Engineering");
          else
               exit(0); break;

     case 'C':
          if(option == 7)
```

Continued...

```
            strcpy(program, "Diploma in Management");
        else if(option == 8)
            strcpy(program, "Diploma in IT");
        else
            exit(0); break;
}
```

d. Write the function definition for function called *getcourse()* that takes in *code* and *ticket* as parameter and returns the *payment* amount. Use the following sample output as guide. [7 marks]

SAMPLE OUTPUT

```
Code        Course              Price
*****************************************
A           CCNA            (RM 5499.00)
P           CCNP            (RM 6799.00)
M           MCSE            (RM 5999.00)
R           Red Hat         (RM 7199.000)
*****************************************

Enter course code       : P
Enter number of tickets : 2
Payment                 : RM 13598.00
```

Continued...

QUESTION 3 (25 Marks)

a. Based on the following descriptions and sample output screen, write the code segments for a breathalyser program. [8 marks]

In the *main()* function;

i. Declare an array called *content* with size 5, variables called *total*, *average* and *i* (as counter).
ii. Using *for* loop to get the *content* input from 5 users and add up the amount in *total*.
iii. Call function *getlimit(...)* and pass *content* as parameter.
iv. Calculate the *average* of all 5 contents and display the value.
v. Write the function header for *getlimit()*.
vi. In function *getlimit()*, using *for* loop, display the *content* which exceeds the permissible limit of 0.08 mg/L.

SAMPLE OUTPUT

```
Enter blood alcohol content 1: 0.04
Enter blood alcohol content 2: 0.09
Enter blood alcohol content 3: 0.05
Enter blood alcohol content 4: 0.07
Enter blood alcohol content 5: 0.11
Blood alcohol content exceeds limit : 0.09 mg/L
Blood alcohol content exceeds limit : 0.11 mg/L
Average blood alcohol content : 0.07 mg/L
```

b. Trace the output for the following program. [4 marks]

```
int array[6] = {30, 22, 14, 8, 6, -2};
int *j, *k;

k = &array[3];
printf("\n%d", *k + 2);
printf("\n%d", *(k + 2));

j = &array[1];

printf("\n%d", *j - *k);
printf("\n%d\n", *(--k) - *j);
```

Continued...

c. Based on the following descriptions and sample output screen, write the code segments for it.

i. Create a structure called *Stock*. Declare 5 variables, *name* (string), *lot, code* (int) and *price, total* (float).

In the *main()* function;

ii. Create a structure variable called *portfolio*.

iii. Get user's input for the stock's *code* and *lot* size.

iv. Use *switch-case* statement to determine the *price* per share based on the following table.

v. Calculate the *total* amount of stock purchased using the formula below (1 lot = 100 unit of shares)

$$total = price\ x\ lot\ x\ 100$$

vi. Use *if-else* statement to determine the *name* of the stock based on the following table.

Code	Name	Price (RM)
6012	Maxis	6.35
6947	Digi	5.10
6888	Axiata	5.05

vii. Display the stock's *name* and *total* amount. [13 marks]

SAMPLE OUTPUT

```
Enter the stock code : 6888
Enter the lot size   : 5
Stock name           : Axiata
Total Price          : RM 2520.00
```

Continued...

SECTION B (25 Marks)

Instruction: *Choose and answer* ***ONLY ONE (1)*** *question from this section and write your answers in the answer booklet provided.*

QUESTION 1 (25 Marks)

Write a **complete C program** that determines the High Speed Rail (HSR) fare from Bandar Malaysia to three selected destinations based on the following guidelines.

- Declare the fares amounts as constant using preprocessor directive based on the following table.

Destination	Code	Constant	Fare (RM)
Singapore	*1*	FARE1	250.00
Iskandar Puteri	*2*	FARE2	200.00
Ayer Keroh	*3*	FARE3	100.00

- Declare a *structure* called *HSR* that has *code, ticket* (int), *fare, subtotal* (float) and *status* (char). Create a structure variable array *info*, which has 3 elements.

- In *main()*
  - Use *for* loop and repeat for three times:-
    - Get the destination *code, status* and number of *tickets* from user.
    - Call function *getfare()*, passing the destination *code* and *status* as parameter.
    - Call function *getsub()*, passing the *fare* and number of *ticket* as parameter.
    - Calculate the *total* fare amount by adding all the subtotal.
    - Display the calculated *subtotal* fare.
  - Display the calculated *total* fare.

- In function *getfare()*
  Set the *fare* based on the destination *code* and the *status* (refer to the table below).
  - Use *if-else* statement to determine the *status*.
  - Use *switch-case* statement to set the *fare* based on the destination *code*.

Code \ Status	N (normal)	S (student)	R (retirees)
1	FARE1	70% of FARE1	50% of FARE1
2	FARE2	70% of FARE2	50% of FARE2
3	FARE3	70% of FARE3	50% of FARE3

  - Return *fare* to *main()*.

- In function *getsub()*
  - Calculate the *subtotal* by multiplying the *fare* and the number of *ticket*.
  - Return the *subtotal* to *main()*.

Continued...

SAMPLE OUTPUT

```
Enter destination code      : 1
Enter your status           : N
Enter the number of ticket : 2
Subtotal                    : RM 500.00

Enter destination code      : 2
Enter your status           : S
Enter the number of ticket : 1
Subtotal                    : RM 140.00

Enter destination code      : 3
Enter your status           : R
Enter the number of ticket : 4
Subtotal                    : RM 200.00

Total fare                  : RM 840.00
```

Continued...

QUESTION 2 (25 Marks)

Write a **complete C program** that stores the details of particular smart phone models into a text file.

In *main( )* :

- Declare all necessary variables.
- Open the file *List.txt* for *appending*.
- Get the phone's *code*, *quantity* and *promotional* code from user.
- Call function *getmodel()*, passing the phone's *code* as parameter.
- Call function *getprice()*, passing the phone's *code* and *quantity* as parameter.
- Call function *getdiscount()*, passing *promotional* code as parameter.
- Calculate the *subtotal* amount by subtracting the discount from the original price.
- Write the *model, subtotal, quantity* and *promotional* code into file *List.txt*.
- Repeat the process as long as user wants to continue. Use *do-while* loop.
- Close the file pointer.

In *getmodel ()*:

- Determine the phone's model using *switch-case* statement based on the following table.

Code	Model
I	iPhone7
G	GalaxyS8
H	HuaweiP9

- Return the *model* to *main()*.

In *getprice ()*:

- Calculate the price by multiplying the price/unit with the quantity. Determine the price/unit using *switch-case* statement based on the following table.

Code	Price
I	3799.00
G	3299.00
H	3016.00

- Return the *price* to *main()*.

Continued...

In *getdiscount ()*:

- Determine the *discount* using *if-else* statement based on the following table.

Promotional code	Discount
SALE	10%
BONUS	20%
CLEARANCE	30%
Else	0

- Return the *discount* to *main()*.

Contents of *List.txt before execution*
<model><subtotal> <quantity ><promo>
GalaxyS8 8907.30 3 SALE

SAMPLE OUTPUT

```
Enter phone's code      : I
Enter phone's quantity  : 2
Enter promotional code  : -

Enter [Y] to continue: Y

Enter phone's code      : H
Enter phone's quantity  : 3
Enter promotional code  : BONUS

Enter [Y] to continue: N
```

Contents of *List.txt after execution*			
<model>	*<subtotal>*	*<quantity >*	*<promo>*
GalaxyS8	8907.30	3	SALE
iPhone7	7598.00	2	-
HuaweiP9	7238.40	3	BONUS

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